Introduction: Root fractures in permanent teeth are less frequent injuries comprising 0.5 to 7 % of all dental trauma cases [Andreasen et al., 2004]. Horizontal root fractures occur mainly in the anterior region of the maxilla, usually owing to a frontal impact, more frequently observed in fully erupted teeth with complete root formation [Andreasen et al 2004; Versiani et al., 2008]. Horizontal fractures occur most frequently in the middle-third of the root and rarely in the apical-third [Caliskan and Pehlivan, 1996; Andreasen et al., 2004; Andreasen et al., 2007]. The prognosis is poorer if the fracture level is in the coronal third [Feiglin, 1995].

Treatment is usually directed at repositioning and stabilizing a tooth (if necessary) in its correct position and monitoring the tooth for an extended period for pulp vitality [Clark and Eleazer, 2000]. Root fractures represent complex healing patterns due to concomitant injury to the pulp, periodontal ligament, dentine and cementum [Andreasen et al., 2004].

Mineral Trioxide Aggregate (MTA) is a biocompatible material with numerous interesting clinical applications in endodontics. The material appears to be an improvement over other materials for some endodontic procedures that involve root repair and bone healing [Schwartz et al., 1999; Schmitt et al., 2001; Bramante et al., 2006].

This report records the use of MTA to achieve a barrier on the coronal aspects of the fracture lines in maxillary central incisors with horizontal root fractures. The treatment and long term 3-year follow-up of four treated maxillary central incisors are presented.

Case Reports: Case 1: A 10-year-old boy came to Dept. Paediatric Dentistry Clinic (Istanbul University) after an accidental trauma in school 4 hrs earlier. His medical history was non-contributory. Clinical examination revealed luxation and occlusal displacement of the maxillary central incisors (11, 21). Subsequent to the injury, the patient complained of an inability to bite, a swollen upper lip and pain on palpation in the periapical region of the tooth. A radiographic examination revealed horizontal root fractures in the middle third of both roots of the maxillary central incisors.

Treatment: The extruded teeth were repositioned and immobilised with a wire-composite splint, under a suitable prophylactic antibiotic and anti-inflammatory analgesic coverage for one week. Antiseptic procedures with 0.12% chlorhexidine gluconate were carried out. The positions of the teeth were corrected, immobilized with a wire-composite splint and kept under observation. A soft diet and avoidance of chewing on the maxillary incisors were suggested.

Follow-up: The teeth responded positively to electrical pulp testing and also with cold spray. However, after another 2 months the child had a second trauma to the same region and the teeth did not respond to the vitality tests and were sensitive to percussion (Figure 1a). Endodontic therapy was carried out and after instrumentation and a paste of calcium hydroxide (CaOH) was packed into the canals to the fracture lines. The coronal access was restored with zinc oxide-eu-

Key words: horizontal root fracture, MTA, dental trauma

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MTA in horizontal root fractures

**Figure 1.** Periapical radiographs of Case 1.
A. Horizontal fractures of 11 and 21 at the 1st visit with splint. B. Traumatised teeth treated with MTA 12 months later. C. Radiographic appearance of the teeth 36 months later.

**Figure 2.** Periapical radiographs of Case 2
A. Traumatised tooth at the 1st visit. B. Radiographic view of the treated tooth 12 months later. C. Radiographic appearance of the treated tooth 36 months later.

**Figure 3.** Periapical radiographs of Case 3
A. Traumatised tooth at the 1st visit. B. The treated tooth 12 months later. C. The treated tooth 36 months later.